Camp Lick Project

Silviculture Report

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for:
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Introduction

The intent of this specialist report is to describe the existing conditions of forest vegetation and to document the expected effects to this resource from the implementation of alternative 1 (no-action) or alternative 2 (proposed action) in the Camp Lick planning area. The proposed action includes a suite of silvicultural treatments, riparian and upland watershed restoration treatments, road system activities, range fence construction, and interpretive sign installation. The silvicultural aspects and implications to the affected environment and environmental consequences of the treatments will be covered in this report.

This analysis assumes that all of the project design criteria for the proposed actions are carried out as described in the Camp Lick final environmental assessment (FEA) Appendix A – Project Activity Tables and Appendix C – Project Design Criteria.

Current forest vegetation conditions in the planning area are a result of past management including timber harvest, grazing, and fire suppression. Settlement in the John Day area by European immigrants began in the mid-1800s, initially by those involved in mining and grazing. Along the Middle Fork of the John Day River, timber harvest began in the early 1900’s primarily to fulfill mining needs. This was accomplished by railroad logging, which extended into the planning area from the Middle Fork of the John Day River. Moving west through the area, timber harvest continued, transitioning from railroad logging to cat skidding and truck hauling in the early 1940s. During the 1980s and 1990s, the Malheur National Forest logged approximately 9,400 acres within the planning area. Of the 9,400 acres harvested, approximately 3,000 were regeneration harvest, 3,000 were overstory removals, and 3,000 were intermediate harvests. Harvest in the 1980s, particularly the intermediate harvests, often removed a high percentage of the ponderosa pine while leaving grand fir for future crop trees. Volumes removed generally ranged from 5,000 to 10,000 board feet per acre. Figure 1 displays the overall extent of past harvest. Details on past grazing and fire suppression practices are described in other resource section.

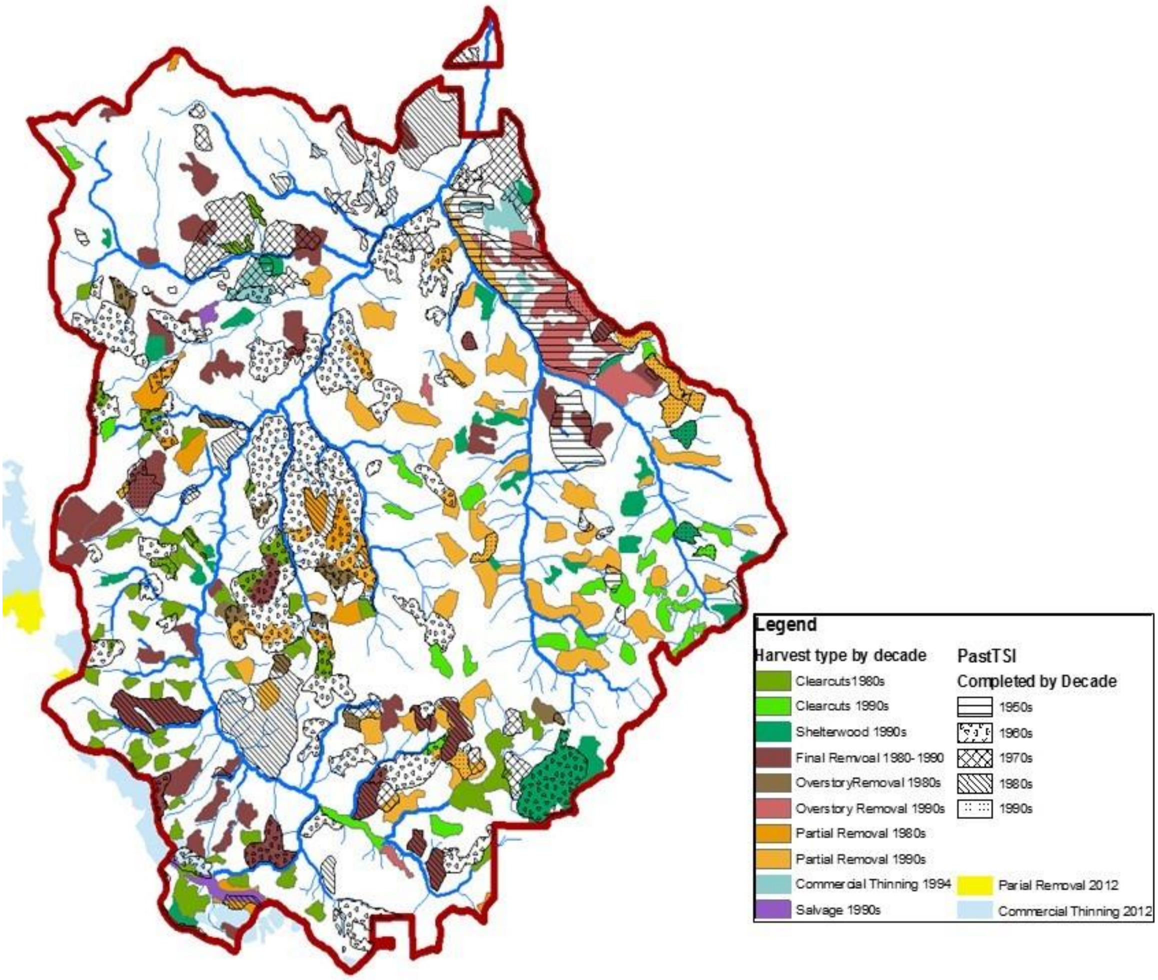

Figure 1. Mechanical treatment 1980 to present by harvest type and decade

Regulatory Framework

Malheur Forest Plan

Proposed activities of the project are based on the management direction established in the Malheur National Forest Land and Resource Management Plan (USDA Forest Service 1990a). Camp Lick FEA chapter 1 contains a table detailing the Malheur National Forest Plan management area allocations in the Camp Lick planning area, and Camp Lick FEA Appendix B – Maps, Map 2 contains a management allocations map, illustrating the arrangement of various forest plan management areas (MAs) within the planning area. Management goals and objectives, along with specific management area standards are detailed in the Malheur National Forest Plan. The Malheur National Forest Plan provides standards and guidelines for forest vegetation.

Timber Management (Forest Plan, pages IV–36 – 38)

- Based on site-specific silvicultural prescriptions, apply even-aged or uneven-aged management systems to forest timber stands. Determine the applicable management system for any timber stand through the use of specific management area direction and project level environmental analysis.
- Manage to maintain or re-establish ponderosa pine, at time of regeneration, on sites where ponderosa pine is sub-climax.
- Schedule and implement precommercial thinning to achieve desired stocking level based on a site-specific silvicultural examination and interdisciplinary prescription.

Insects and Disease (Forest Plan, page IV–45)

- Apply integrated pest management principles to minimize the impacts of the mountain pine beetle, western spruce budworm, tussock moth and other insect and disease infestations.
- Avoid the creation of vegetation conditions that could promote insect and disease infestations.

Aspen (Forest Plan, pages IV-31, IV-56)

The Malheur National Forest Plan standards and goals relevant to the desired condition for aspen and other hardwoods and shrubs include:

- Maintain or enhance quaking aspen stands using overstory removal and prescribed fire as principal means of regeneration where appropriate. Protect root sprouts where needed and practical.
- Manage the composition and productivity of key riparian vegetation to protect or enhance riparian-dependent resources. Emphasis would be on the reestablishment of remnant shrub and tree communities.

Regional Forester's Forest Plan Amendment 2 (Eastside Screens)

Additional management direction has been provided by forest plan amendments approved since 1990, such as "Interim Management Direction Establishing Riparian, Ecosystem and Wildlife Standards for Timber Sales" (USDA Forest Service 1995; also known as Regional Forester's Eastside Forest Plan Amendment 2 "Eastside Screens").

All timber sales would be designed to incorporate the interim riparian, ecosystem and wildlife standards as set forth in the Regional Forester's Forest Plan Amendment 2. These standards supersede previous Forest Plan and other management guidelines.

Key wildlife and ecosystem standards that are applicable to the vegetation portion of this analysis include:

- Characterize the proposed timber sale and its associated watershed for the major ecosystem pattern and compare to the historical range of variability (HRV).

For the purposes of this standard, late and old structural stages (LOS) can be either "old forest multi-strata," or "old forest single-stratum". The interim wildlife standard has two possible scenarios to follow based on the HRV for each biophysical environment (plant association group) within a given watershed. Scenario A applies when any one type of LOS is below HRV. If both types occur within a single biophysical environment and one is above HRV and one below, use

Scenario A. Scenario B applies when both LOS stages within a particular biophysical environment are at or above HRV. The following standards apply under scenario A and B:

Scenario A:

- If either one or both of the late and old structural (LOS) stages falls below HRV in a particular biophysical environment within a watershed, then there should be no net loss of LOS from that biophysical environment. Do not allow timber sale harvest activities to occur within LOS stages that are below HRV.
- Some timber sale activities can occur within LOS stages that are within or above HRV in a manner that maintains or enhances LOS within that biophysical environment. It is allowable to manipulate one type of LOS to move stands into the LOS stage that is deficient if this meets the historical conditions.
- Outside of LOS, many timber sale activities are allowed. The intent is still to maintain and/or enhance LOS components in the stands subject to timber harvest as much as possible, by adhering to the following standard:
    - Maintain all remnant late and old seral and/or structural live trees greater than or equal to 21 inches DBH that currently exist within stands proposed for harvest activities.
    - Manipulate vegetation structure that does not meet late and old structural conditions, in a manner that moves it towards these conditions as appropriate to meet HRV.
    - Maintain open, park-like conditions where this condition occurred historically. Manipulate vegetation in a manner to encourage the development and maintenance of large diameter, open canopy structure (while understory removal is allowed, some amount of seedling, sapling, and poles need to be maintained for development of future stands).
    - Maintain connectivity and reduce fragmentation of LOS. Harvesting within connectivity corridors is permitted if all criteria are met. Some of which includes: canopy closures will be maintained within the top one-third of site potential; some amount of understory (if it occurs) is left in patches or scattered to assist in supporting density and cover; some understory removal, stocking control, or salvage may be possible activities, depending on the site.

Scenario B:

If the single, existing late and old structure stage is within or above HRV or if both types of LOS stages occur and both are within or above HRV, then timber harvest can occur within these stages as long as LOS conditions do not fall below HRV. Enhance LOS structural conditions and attributes as much as possible, consistent with other multiple use objectives.

The intent of the following direction is to maintain options by impacting large and/or contiguous stands of LOS as little as possible, while meeting other multiple use objectives.

Harvest activities can occur in the following stand types in order of priority.

- Activities should occur within stands other than LOS as a first priority.
- Second priority for harvest activities is within smaller, isolated LOS stands less than 100 acres in size, and/or at the edges of large blocks.
- Some harvesting can occur, as a last priority, within the interior of large (greater than 100 acre) LOS stands. No regeneration or group selection activities are allowed.

National Forest Management Act

The National Forest Management Act (NFMA) provides that timber harvest and other silvicultural practices shall be used to prevent damaging population increases of forest pest organisms, and treatments shall not make stands susceptible to pest-caused damage levels inconsistent with management objectives.

Silviculture treatments are proposed for some stands in order to improve tree vigor of the desired leave trees and to maintain or enhance the plant diversity. The NFMA provides for these treatments where they increase the growth rate of residual trees, favor commercially valuable species, favor species valuable to wildlife, or achieve some other multiple-use objective. Units proposed on suitable lands have been reviewed by a certified silviculturist and determined that they are located on suitable lands and regeneration harvest units are capable of being regenerated within 5 years of timber harvest.

Resource Elements, Indicators and Measures

The analysis indicators for assessing effects of each alternative and for comparing alternatives include the historical range of variability (HRV) as defined by structural stages across the landscape (particularly within old forest), stand density, species composition, and the extent to which the area is treated to achieve these objectives and provide for more resistant and resilient vegetative conditions given the historical fire regime (see Table 1). These indicators and how they are measured are described in the existing condition sections.

Table 1. Resource elements, indicators and measures for assessing effects

Resource element	Resource indicator	Measure	Source
Tree density	Stand Density Index (SDI)	Percentage change of acres above the management zone (MZ), within the MZ, and below the MZ as defined by MaxSDI	Suggested stocking levels for forest stands in Northeastern Oregon and Southeastern Washington: an implementation guide for the Umatilla National Forest (Powell 1999)
Forest structure	Structural stages	Percentage change of structural stages in relation to HRV, particularly within old forest	Regional Forester's Plan Amendment #2 (Eastside Screens; USDA Forest Service 1995)
Forest composition	Early seral trees	Percentage of early seral species across project area	Powell 1998

Methodology

Alternative 1 analysis and discussion is based on the environmental outcomes resulting from taking no action. Alternative 2 analysis and discussion is focused on silviculture treatments, riparian and upland watershed restoration treatments, and prescribed burning, as described in Camp Lick PEA chapter 2. These are the restoration activities that were modeled for the proposed action alternative (alternative 2). The resource elements and indicators identified in Table 1 are used to compare the two alternatives throughout this document. This report will not address road activities, interpretive sign installation, or range fence construction because those activities would not have a measurable change with respect to the resource elements and indicators identified in Table 1.

Forest Health Protection Surveys

A formal site visit to the Camp Lick planning area by Forest Health Protection, Blue Mountains Forest Insect and Disease Service Center occurred on June 11th and 12th, 2014. The objective of this visit was to assess the overall health of the trees and the forested environment of the Camp Lick planning area. A letter dated June 15, 2015 by Lia Spiegel, Michael Jennings, Mike Johnson, and Michael McWilliams is available in the Camp Lick project record and documents their findings, which will be referenced in this report.

Vegetation Layer

The Natural Resource Inventory System (NRIS) vegetation polygon layer was used as the base layer for classifying vegetation. There are 2,217 forested polygons (37,125 acres) within the Camp Lick planning area, with 476 polygons (3,190 acres) representing non-forest types. There are approximately 477 acres of land inholdings not managed by the US Forest Service within the boundary of the Camp Lick planning area.

Stand Exams

Formal stand exams were taken in the planning area, covering 5,757 acres and 156 stand polygons (stands). Ninety percent of these exams were taken in the year 2014, covering 5,227 acres.

The FSVeg Spatial Data Analyzer Nearest Neighbor (NN) process was used to populate forested stands without stand exam data from stands with existing stand exam data. NN analysis uses satellite imagery (2014 LandSat8 data), spatial relationships, and topographic information to match target stands without data to the most similar reference stand with data. Tree data from the reference stand is then assigned to the target stand without data (imputation). Statistics were generated to determine if the NN analysis met minimum requirements for a statistically valid run and would be considered dependable for environmental analysis modeling. Checks for statistical validity and quality passed. Canonical R squared 1st variate check is 0.92 and a value greater than 0.8 is generally considered dependable for environmental analysis modeling. Verification of plant association and structure occurred in 2015 and 2016.

FSVeg Spatial Data Analyzer

FSVeg Spatial Data Analyzer is an ArcGIS extension that was designed in order to allow users to model growth and vegetation treatments on forested stands using Forest Vegetation Simulator (FVS) and stand exam data stored within the Forest Service corporate data management system for stand exams (FSVeg). All three of the resource indicators and measures were analyzed with FSVeg Spatial Data Analyzer.

Incomplete and Unavailable Information

FSVeg Spatial Data Analyzer has a limited ability to simulate desired stand conditions in terms of heterogeneity (i.e., variability, skips, gaps). Incorporating and enhancing naturally occurring skips and gaps within the forested environment mimics natural stand conditions that were maintained by disturbance processes, such as endemic insect infestations, root rot pockets, and patchy, mosaic fire mortality patterning. Implementation of skips and gaps would leave the forest heterogeneous so that naturally occurring disturbances would be able to function without the loss of entire stands, and the residual landscape would not look like an unnatural, uniform tree farm after restoration treatments. These landscape features are important to stakeholders familiar with the area, as represented by public comments received during the 2016 Camp Lick scoping period and 2017 30-day comment period, and would be planned within the silvicultural prescriptions.

Monitoring

Monitoring for forest vegetation would include monitoring for silvicultural treatments and prescribed burning. Monitoring silvicultural treatments would include monitoring the stands to maintain proper leave tree composition and density. This would be conducted by silviculture and timber personnel, measuring variable radius plots for select units. It would also include monitoring of designation by prescription (DxP), a harvest method completed by contractors that may take place in a stewardship contract, to ensure silvicultural objectives are met and contract specifications are followed.

Monitoring of silvicultural treatments would include monitoring contract compliance for stand improvement biomass thinning, strategic fuel breaks, biomass removal, and/or juniper encroachment treatment, to ensure silvicultural objectives are met. Prescribed burning would be visually monitored to ensure that widespread mortality levels do not exceed mortality limits described in the silviculture prescription directly after burning. In many cases, a silviculturist would be on site during prescribed burning, working in tandem with the burn boss. Mortality would also be assessed several years after burning to determine trends in mortality and the apparent causes of those trends in a monitoring feedback loop that would extend back to the interdisciplinary team, available for use within the adaptive management spiral. The adaptive management spiral is a concept of continued learning and sharing of information to better achieve desired conditions or outcomes on the path to desired conditions.

Spatial and Temporal Context for Effects Analysis

All alternatives analyzed would occur within the 40,000 acre Camp Lick planning area. This is the spatial zone of influence that has been analyzed for silviculture.

The timeframe for the direct and indirect effects of vegetation management is relatively short-term for forest development. Baseline/existing conditions are expressed in data collected and analyzed around 2015. Short-term effects are measured two years later, in 2017. The stand and tree data from 2015 was grown out (modeled) 50 years for effects comparisons. In order to compare the two alternatives equally, all proposed vegetation management actions (cutting and burning) were applied to Alternative 2 in 2015 within the model. Direct and indirect effects are assessed 2 and 30 years into the future. The timeframe for cumulative effects is relatively long-term for forest development and includes cumulative effects of past logging and current restoration treatments on species composition, stand density, and stand structure.

Past, Present, and Foreseeable Activities Relevant to Cumulative Effects Analysis

Timber harvest, fire suppression, and grazing are the past practices that have contributed to the current stocking levels and structural stage composition within the Camp Lick planning area. These activities have reduced available resources to trees, such as sunlight and moisture. When vital resources such as light and water are limited within a forest system, trees become stressed and this stress combined with the past activities within the planning area has led to increases in stand densities, exposing forested lands to the threat of insects, disease, and wildfire. Past timber harvest, fire suppression, and grazing have also led to increases within the old forest multi strata

(OFMS) and stem exclusion (SE) structural stages, and have reduced the old forest single stratum (OFSS), understory reinitiation (UR), and stand initiation (SI) structural stages.

Tree Density

Affected Environment

Existing Condition

The 2008 Camp Creek Watershed Action Plan focuses on the three 6th field subwatersheds that comprise the Camp Lick planning area (Lower Camp Creek, Middle Camp Creek, and Lick Creek) and a minor amount of non-US Forest Service land for a total of 40,294 acres. The plan states that 92 percent of the landscape is forested and "eighty percent of the forested area is overstocked, meaning that conifer stands contain higher densities of trees relative to historic benchmarks, heightening the forest's susceptibility to insects and disease. Nearly 50 percent of the stands are so dense that they are highly to extremely susceptible to crown fire. . . . Conifers (including junipers) have expanded into meadows and riparian areas throughout the watershed and have displaced or compete with willows, aspen, cottonwood, and alder. All of these factors may be contributing to lower base flows within the watershed, but the extent is unknown" (USDA Forest Service 2008).

The watershed action plan goes on to describe how 100 years of fire suppression has promoted increased stand densities and made the area unable to function within historical fire regimes. This information, along with reduced old growth and more early to mid-seral stands, leaves the upland vegetation with a rating of "functioning-at-risk." This rating is characterized by "some forest communities are outside of HRV; stand densities and species composition of some stands are at moderate risk to crown fire; openings are either below or above the historical ranges (typically 5 to 20 percent); there is moderate conifer and/or juniper encroachment into grasslands, shrublands, and/or hardwoods" (USDA Forest Service 2008).

Tree density is a characterization of tree stocking for an area. It expresses the number of tree stems occupying a unit of land. Stocking can be expressed as a "stand density index" or in some other measure of relative density, or it can be quantified in absolute terms as a number of trees per acre or as the amount of basal area, wood volume, or canopy cover on an area (Powell 1999).

Stand Density Index is a common measure of density that allows comparisons across units independent of individual tree age or size (Powell 1999), and will be used to with this analysis. For any given average tree size for each species there is a limit to the number of trees per acre that may coexist in a stand. This limit is known as the Maximum SDI (Max SDI). The percent of Max SDI (SDI/Max SDI) is an index of intra-tree competition for site resources and is an indication of overall stand health, including tree growth and mortality, susceptibility to mortality from insect and disease, and fire hazard. Percent Max SDI is generally divided into categories that define tree growth, stand growth, and mortality. Below the Management Zone (MZ, 0-40% Max SDI), there may be natural regeneration and there is generally high individual tree growth within the stand. Within the Management Zone (40-60% Max SDI) site resources are generally being captured into tree growth and there is high stand growth. Above the management zone (MZ – FS, 60 to 80 percent Max SDI) there is consistent competition induced mortality occurring. As stocking levels increase to 80 percent and greater, susceptibility to insect infestation and high severity, stand replacement wildfire increases, mortality increases, and stands stagnate. Figure 2 shows the percentage of area within Camp Creek planning area below, within, and above the

Management Zone. Almost 80 percent of the Camp Lick planning area is above the Management Zone, with high stand densities that are susceptible to competition induced mortality, insect and disease infestation, and high severity wildfire.

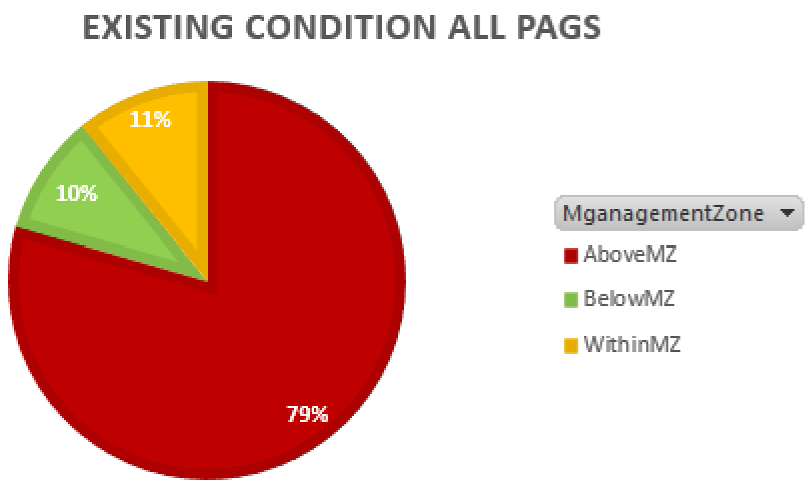

Figure 2. Existing condition stand density index ranges

Desired Condition

Malheur Forest Plan Forest-wide standard #98 provides direction to "Maintain stand vigor through the uses of integrated pest management such as stocking level control and species composition in order to minimize losses due to insects and disease" (USDA Forest Service 1990a, page IV-37).

Stand Density Index is used to compare stocking levels and growing space available for trees within stands. "Stand density index is the number of trees per acre that a stand would have at a quadratic mean diameter of 10 inches" (Cochran 1994). Cochran (1994) explains how SDI can reveal more useful information about a stand than basal area alone because basal area for "normally stocked" stands will vary with age and site index. "Normally" stocked stands are even-aged and consist of dominant, codominant, intermediate, and suppressed crown classes. Upper management zones (UMZs) and lower management zones (LMZs) have been established to aid forest managers in density control levels for healthy, desired stands. The UMZ can be thought of as the point where the trees in a stand are no longer growing at their full potential. Essential resources for trees are limited at this point and some trees will start to decline and die. The UMZ is about "75 percent of the SDI of a "normally" stocked stand. The LMZ is "often set at 50 percent of normal density (that is, 67 percent of the UMZ)" (Cochran 1994).

Powell (1999) clarified the relationship of percent of Max SDI to full stocking SDI, and calculated trees per acre and basal area per acre by average stand diameter for the UMZ and LMZ for each major tree species within each plant association on the Umatilla National Forest. This information was based on Cochran's full stocking SDIs and used Cochran's site index adjustment and SDI adjustment methods. Powell (1999) suggested stocking levels were used as a general guideline for proposed treatments within the Camp Lick planning area. For example, a PIPO/CAGE (ponderosa pine/elk sedge) potential vegetation type (PVT), is shown to have full stocking at a SDI reading of 201 with the upper management zone at 82 and the lower management zone at 55. This PVT equates to approximately 30 to 45 basal area to be considered within the management zone.

"Because open stands generally have higher vigor levels than dense stands, they tend to be more resistant to insect and disease impacts. Maintaining a wide stand spacing results in a condition where the trees are not experiencing significant competition. Although not universally true, vigorous trees are better able to withstand attack from insects, pathogens and parasites (Safranyik et al. 1998)" (Powell 1999).

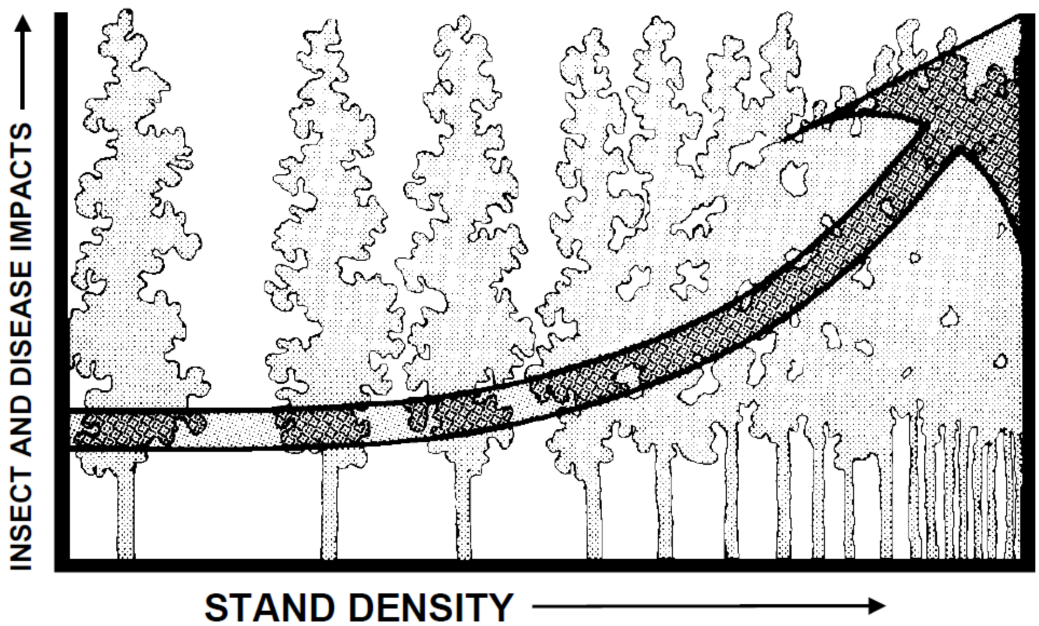

Figure 3. Insect and disease impacts variation with stand density (from Powell 1999)

Figure 3 illustrates the value of minimizing insect and disease damage by maintaining high stand vigor. "Perhaps no silvicultural approach can contribute as much to forest health as stand density management. Thinning and other density management treatments are an effective way to apply integrated pest management, which involves the use of silvicultural measures to reduce susceptibility or vulnerability to insects, diseases, parasites and other harmful agents (Nyland 1996)" (Powell 1999).

The planning area was reviewed by the Blue Mountains Forest Insect and Disease Service Center, and recommendations provided. "In dry ponderosa pine/Douglas-fir sites, we found current year western pine beetle (WPB), *Dendroctonus brevicomis*, and MPB attacks in ponderosa pine. Populations of both of these beetles are currently high in the Blue Mountains and high near the Camp Lick area. We recommend managing to the lower limit of the management zone to promote tree vigor as recommended by Powell (1999). On dry, rocky sites, recommended stocking may be as low as 30 square feet per acre basal area (Powell, 1999). Moisture stressed trees are particularly vulnerable to bark beetle attacks, and when populations are high, lethal attacks are even more likely."

The full report can be found in the project record. The overall recommendations include:

- Improve vigor of early seral species, ponderosa pine, western larch, western white pine and in some cases, Douglas-fir, through individual tree and/or stand treatments that thin around large, relict individuals; promote early serals or target late seral species for removal.

- Where lodgepole pine has come in under ponderosa pine, improve resistance to mountain pine beetle, *Dendroctonus ponderosae* (MPB) by removing the lodgepole pine.
- Manage dwarf mistletoe at desirable levels by species manipulation and strategic thinning.
- Manage white pine blister rust and mountain pine beetle (MPB) in western white pine by thinning stands to improve air circulation and tree vigor, culturing apparent blister-rust resistant individuals, and planting available resistant seedlings. Where lodgepole pine occurs mixed with western white pine, removing the lodgepole will reduce the risk of MPB infestation.

The 2008 Camp Creek Watershed Action Plan identifies three recommendations to restore upland processes that directly relate to stand density desired conditions.

1. Thin forest understories to within the HRV
2. Thin conifers to provide growing space for hardwoods
3. Reduce juniper distribution and densities to match the HRV

Project Design Criteria and Mitigation Measures

Table 2. Project design criteria for silvicultural treatments

Criteria number	Objective	Design criteria	Alternative
Silviculture-1	Reduce the risk of spreading annosus root disease	All ponderosa pine stumps greater than 14 inches diameter at breast height on low-to-moderate productivity sites (site productivity classes 6 and 7) would be treated with Sporax or Cellu-treat within 24 hours of cutting, preferably as soon as possible.	2

Environmental Consequences

Alternative 1 – No Action

Direct and Indirect Effects

Given the no action alternative, approximately 37,000 acres of forested stands would likely experience little change with respect to tree density in the short-term, which has been set at 2 years after modeling of all vegetation management treatments. FSVeg Data Analyzer shows the existing condition of the forested stands as 79 percent above the management zone, 11 percent within, and 10 percent below. Two years later, the data shows 82 percent would be above, 8 percent would be within, and 10 percent would be below.

Long-term analysis, using modeling to simulate tree growth over a 30-year period, shows forested stands would be at 88 percent above the management zone, 10 percent would be within, and 2 percent would be below.

With forested stands 79 to 88 percent above their management zones, trees are stressed, heavily competing for resources, and are susceptible to large scale mortality given a wildfire, drought, insects, and diseases. “Many land managers would agree that wildfire suppression was a policy with good intentions, but it was a policy that failed to consider the ecological implications of a major shift in species composition. White firs and Douglas-firs can get established under ponderosa pines in the absence of underburning, but they may not have enough resiliency to make it over the long run, let alone survive the next drought. This means that many of the mixed-conifer stands that have replaced ponderosa pine are destined to become weak, and weak forests are susceptible to insect and disease outbreaks (Hessburg and others 1994)" (Powell, 1994).

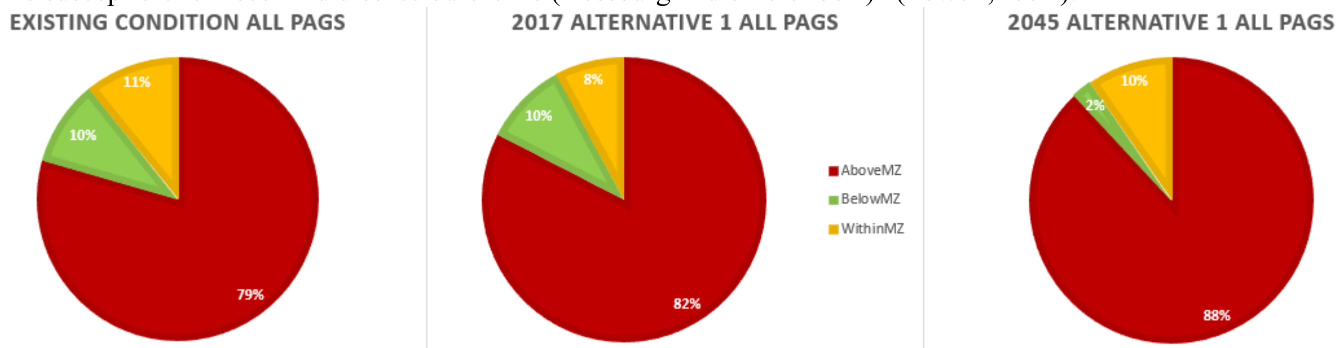

Figure 4. Alternative 1 (no action) stand density index ranges

Cumulative Effects

By the Council on Environmental Quality (CEQ) definition, because there are no direct or indirect effects, no cumulative effects would occur. Taking no action to reduce stand densities through mechanical methods or prescribed burning would keep the area on its current trajectory and increase the risk of large-scale stand replacement fire and epidemic insect outbreaks.

Without implementation of an action alternative within the Camp Lick planning area, there would still be actions from other projects that are ongoing or reasonably foreseeable. These actions would occur over a small percentage of the total planning area and may include projects authorized under the Aquatic Restoration Decision, signed September 2014. The County Road 18 Healthy Forest Restoration Act (HFRA) Project and Plantation Maintenance are two projects that are currently ongoing and overlap with the Camp Lick planning area. The first focuses on fuel breaks along County Road 18 (commercial thinning, non-commercial thinning, and prescribed burning) and the latter authorizes precommercial thinning and piling by hand in previous timber harvest units.

The Aquatic Restoration Decision, County Road 18 Healthy Forest Restoration Act Project, and Plantation Maintenance all authorize projects which would decrease stand density and increase stand resilience to disturbance. These projects are isolated from one another on the landscape and would not help create watershed resiliency or landscape restoration on their own.

Alternative 2 – Proposed Action

Direct and Indirect Effects

SDI as a measure of stand density can be used as an indicator of stand health and vigor, and susceptibility to insects, namely the fir engraver beetle (Oliver et al. 1996) and mountain pine beetle. Alternative 2 would bring SDI levels to within desired ranges (approximately 25 to 50 percent of MaxSDI) for all restoration thinning treatments.

Effects from implementation of alternative 2 would be measureable in a short amount of time, and have long lasting results. In the short-term, acres of forested stands above the management zone would decrease and acres within and below the management zone would increase. Two years after treatments, FSVeg Data Analyzer shows 58 percent of forested stands would be above the management zone, 15 percent within, and 27 percent below.

Long-term analysis (modeling) shows forested stands at 65 percent above the management zone, 18 percent within, and 17 percent below.

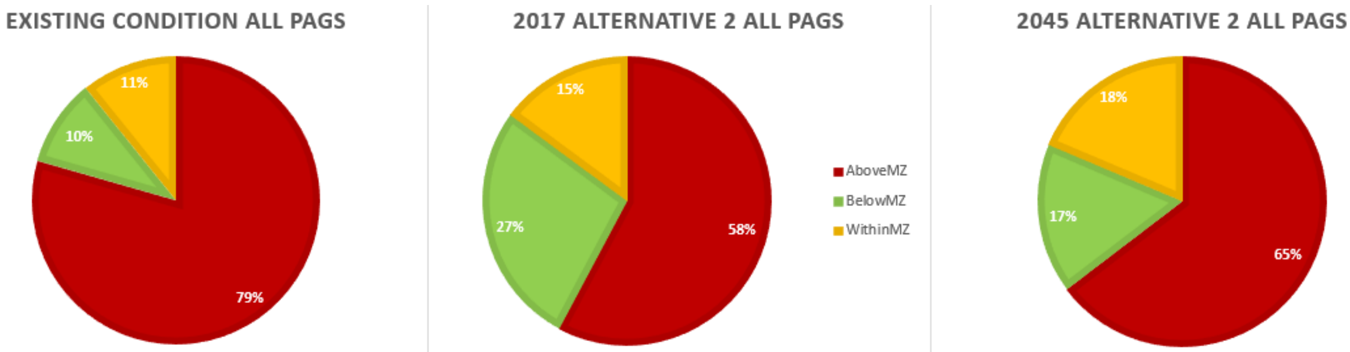

Figure 5. Alternative 2 (proposed action) stand density index ranges

The purpose and need of the project would be addressed across the landscape by improving resiliency and resistance to disturbances such as wildfire, drought, insects, and disease. Forty-two (short-term) to 35 percent (long-term) of the acres of forested stands would be within or below their management zones under alternative 2. These stands would be set up for successful resiliency to natural disturbances, which are expected to be on a scale that would not overwhelm the forest system. “Ecosystems of the interior Pacific Northwest evolved with a steady diet of wildfire, insect outbreaks, disease epidemics, floods, landslides, human uses, and weather cycles” (Powell 1998).

Variable silvicultural thinning prescriptions would be applied during the implementation phase based on plant association, topographic position, slope, aspect, soils, RHCA objectives, and stand conditions such as insects and disease and general health and vigor.

Cumulative Effects

The effects from past practices (which include timber harvesting, fire suppression, and grazing) have created predominantly young, overstocked stands with a higher percentage of shade tolerant, late seral tree species. These effects are reflected in the existing condition. Implementing the mechanical methods and prescribed burning of the proposed action would decrease stand density indexes, primarily within the Warm Dry PAG, and set stands up to be resilient to insects, disease, and wildfire.

Actions authorized under alternative 2, in combination with large wood placement actions authorized by the Aquatic Restoration Decision, County Road 18 Healthy Forest Restoration Act Project, and Plantation Maintenance would decrease stand densities across the Camp Lick planning area and increase resilience to disturbance at the watershed level. Plantation Maintenance overlapping with the Camp Lick planning area began in 2002 and is ongoing. 3,640 acres were authorized for thinning and 527 acres have been completed thus far. These acres are reflected in the existing condition data in terms of stands within the management zone. When the remaining Plantation Maintenance acres are completed, approximately 7 percent of the Camp Lick planning area would transition from above the management zone to within the management zone. Plantation maintenance activities do not overlap spatially with proposed silviculture treatment units, so the 7 percent is in addition to the 35 percent modeled to be within or below the management zone for the Camp Lick proposed action in the long-term.

Compliance with Forest Plan and Other Relevant Laws, Regulations, and Policies

Proposed activities of the project are based on the management direction established in the Malheur Forest Plan (USDA Forest Service 1990). The management allocations map and table illustrate the arrangement of the various forest plan management allocations (MAs) within the planning area. Management goals and objectives, along with specific management area standards, are detailed in the plan. Alternative 2 would be consistent with the management goals for the Malheur Forest Plan.

Removal of Trees Greater Than 21 Inches Diameter at Breast Height

Alternative 2 would require a Forest Plan amendment to Regional Forester's Eastside Forest Plan Amendment 2, Standard #6(d)(2)(a): "Maintain all remnant late and old seral and/or structural live trees greater than 21 inches DBH that currently exist within stands proposed for harvest activities." Alternative 2 would retain trees 150 years or greater in age versus all trees greater than or equal to 21 inches DBH. This amendment is proposed to allow removal of young (less than 150 years old), relatively large (greater than or equal to 21 inches DBH) grand fir and Douglas-fir trees, within the grand fir and Douglas-fir plant association stands, that are competing with older (generally 150 years old or older) ponderosa pine or western larch trees, causing competition stress and increasing the risk that the older trees may die as a result of insects, drought, or wildfire. This amendment would only apply to stand improvement commercial thinning treatments (including reduce late seral units), outside of riparian habitat conservation areas (RHCAs), dedicated old growth (DOG), and replacement old growth (ROG) areas. By reducing tree densities the older trees would have greater access to water, nutrients, and sunlight resulting in not only their continued existence, but increased growth, health, and vigor (McDowell et al. 2003). Trees greater than 150 years old would be determined by the application of the guidelines "Identifying Old Trees and Forest" (Van Pelt 2008).

Forest Structure

Affected Environment

Existing Condition

There are eight upland forest (UF) PAGs that occur within the planning area as displayed in Table 3. For PAGs that comprise less than 5 percent of the planning area, an HRV analysis was not conducted because the full array of cover types, structural stages, or tree density classes would not be expected for areas of small representation. As a result, three PAGs, Warm Dry UF, Cool Moist UF, and Cold Dry UF were analyzed for HRV based on structure.

Table 3 Vegetation type within the planning area

Plant Association Group	Acres (approximately)	Percent total area
Hot Dry UF	1,500	4%
Warm Dry UF	22,000	55%
Cool Moist UF	6,500	16%
Cool Dry UF	800	2%
Cold Dry UF	3,000	8%
Warm Moist UF	1,500	4%
Warm Very Moist UF	100	<1%

Plant Association Group	Acres (approximately)	Percent total area
Juniper/Woodland	600	1%
Non-Forest	3,000	8%
Total	40,000	-

In the Warm Dry PAG, OFMS is above the upper range of HRV (currently at 24 percent) and OFSS is below HRV (currently at 4.7 percent), resulting in the Warm Dry PAG falling under scenario A of Regional Foresters Forest Plan Amendment #2. The remainder of structural stages in this PAG are above or within the HRV range for all but one of the structural stages. Stand initiation, at less than one percent, is below the lower end of the HRV. The structural stages and their representation relative to the HRV are displayed in Table 4 and Figure 7. Opportunities exist to move acres of OFMS to OFSS, restoring the HRV within OFSS stands over the short and long term and OFMS over the short term.

The HRV for the Cool Moist PAG is displayed in Table 5 and the existing condition of the Cool Moist PAG is displayed in Figure 8. Both OFMS and OFSS are above the HRV resulting in the Cool Moist PAG falling under Scenario B of the Regional Foresters Forest Plan Amendment #2. The only other structural stage within HRV is SECC. SEOC is above HRV while those below include YFMS, UR and SI. Opportunities exist to treat old forest stands within this PAG and improve resiliency, while not falling below HRV.

As displayed in Figure 9, the Cold Dry PAG OFMS is within the range of HRV and OFSS is above HRV, resulting in the Cold Dry PAG falling under scenario B of Regional Forester's Forest Plan Amendment #2. For other structural stages within this PAG, UR is above and YFMS is within the HRV. Opportunities exist to treat old forest stands within this PAG and improve resiliency, while not falling below HRV.

There are 30 aspen stands identified within the planning area. When looking at structure of aspen stands, there are two components to consider: aspen trees and conifer trees. A majority of the aspen stands have absent or declining understories of aspen; aspen understory is defined by a typical age of 0 to 25 years old and primarily suckers or saplings. The mid-story and overstory aspen in the existing stands are in a varied condition, ranging from absent to declining or dead, with some identified as vigorous. Within the aspen stands, there are also encroaching conifer trees. These conifer trees are contributing to overall stand structure in that they are standing trees, occupying space and resources.

Aspen stands are primarily restricted to areas where water accumulates or has longer duration in the soil than surrounding areas. Aspen are moderately drought tolerant but several other species that occur in the planning area, including western juniper, ponderosa pine, and Douglas-fir, are more adapted to drought conditions. Aspen are also a shade-intolerant, early seral species. Even the least shade tolerant conifer in this area is able to out-compete aspen. With aspen being both less drought tolerant and less shade tolerant than other species in the planning area, without disturbance such as fire or harvest of conifers, they would be replaced by conifers over time.

Desired Condition

The Malheur Forest Plan, as amended by the Eastside Screens, provides the basis for actively restoring the historical range of variability and moving the area toward a more resistant and resilient landscape. Currently, values and features associated with and adjacent to the planning area such as old growth and replacement old growth areas, status as one of three priority watersheds on the Malheur National Forest, wildlife habitat, critical fish habitat for threatened Middle Columbia River steelhead, riparian corridors, dispersed recreation sites, scenic views, and private property are susceptible to a wide-scale disturbance. The purpose of silvicultural treatments is to shift forested stands toward ecological structure that is closely related to the historical range of variability (HRV) for each PAG, to reduce susceptibility to insects and disease, wildfire, and drought. There is a need to break up fuel continuity and strategically place treatments to account for these values and features.

The need for increasing resistance and resiliency applies to all plant association groups in the planning area. Through understanding the stand and landscape characteristics that affect fire behavior, and that are necessary to support native species and disturbance processes, forest landscapes can be designed through the use of silvicultural and fuels treatments that increase resilience and minimize the potential for severe effects from fire and insects and disease (Hessburg et al. 2005). Below, the PAGs that comprise a majority of the planning area are listed with what Powell (1998) has determined to be the historical range of variability.

Table 4. Stand structural stages for the Warm Dry plant association group

Structural stage	Historical range of variability[1]
Stand initiation (SI)	5-15%
Stem exclusion open canopy (SEOC)	5-20%
Stem exclusion closed canopy (SECC)	1-10%
Young forest multi strata (YFMS)	5-25%
Understory reinitiation (UR)	1-10%
Old forest single stratum (OFSS)	15-55%
Old forest multi strata (OFMS)	5-20%

[1](Powell 1998)

Table 5. Stand structural stages for the Cool Moist plant association group

Structural stage	Historical range of variability[1]
Stand initiation (SI)	1-10%
Stem exclusion open canopy (SEOC)	0-5%
Stem exclusion closed canopy (SECC)	5-25%
Young forest multi strata (YFMS)	40-60%
Understory reinitiation (UR)	5-25%
Old forest single stratum (OFSS)	0-5%
Old forest multi strata (OFMS)	10-30%

[1](Powell 1998)

Table 6. Stand structural stages for the Cold Dry plant association group

Structural stage	Historical range of variability[1]
Stand initiation (SI)	1-20%
Stem exclusion open canopy (SEOC)	0-5%
Stem exclusion closed canopy (SECC)	5-20%
Young forest multi strata (YFMS)	10-40%
Understory reinitiation (UR)	5-25%

Structural stage	Historical range of variability[1]
Old forest single stratum (OFSS)	0-5%
Old forest multi strata (OFMS)	10-40%

[1](Powell 1998)

As one of the few hardwood species present in the planning area and throughout the Blue Mountains, aspen is a unique habitat type that adds diversity to the conifer dominated forested landscape. The desired condition with respect to the structure of aspen stands would include an increase in the amount of understory aspen, also defined as juvenile aspen, suckers, and saplings. There is also a desire to reduce the conifer structure within aspen stands (USDA Forest Service 1990a, Forest-wide standard #57, page IV-31).

Environmental Consequences

Alternative 1 – No Action

Direct and Indirect Effects

Stand structure across the planning area would not change very much over the short-term with the no action alternative. Over the long-term (30 years has been established as the long-term analysis period for the Camp Lick Silviculture report), there would be measureable changes with regard to structure. Looking at all PAGs within the planning area over 30 years, there would be a doubling in OFMS stand acres from 8,616 (24 percent of forested stands) to 17,718 (48 percent of forested stands). OFSS stands would experience a similar increase over the long-term, doubling from 2,152 acres (6 percent of forested stands) to 4,250 acres (12 percent of forested stands). All other structural stages, which comprise the young to middle aged stands, would decrease over the long-term, as shown in Figure 6. When analyzing forest stand structure, it is useful to look at different PAGs individually because desired or historical conditions vary between PAGs. Below, the three main PAGs within the planning area (which comprise approximately 80 percent of the planning area) are broken out specifically with regard to their stand structure (Figure 7, Figure 8, and Figure 9).

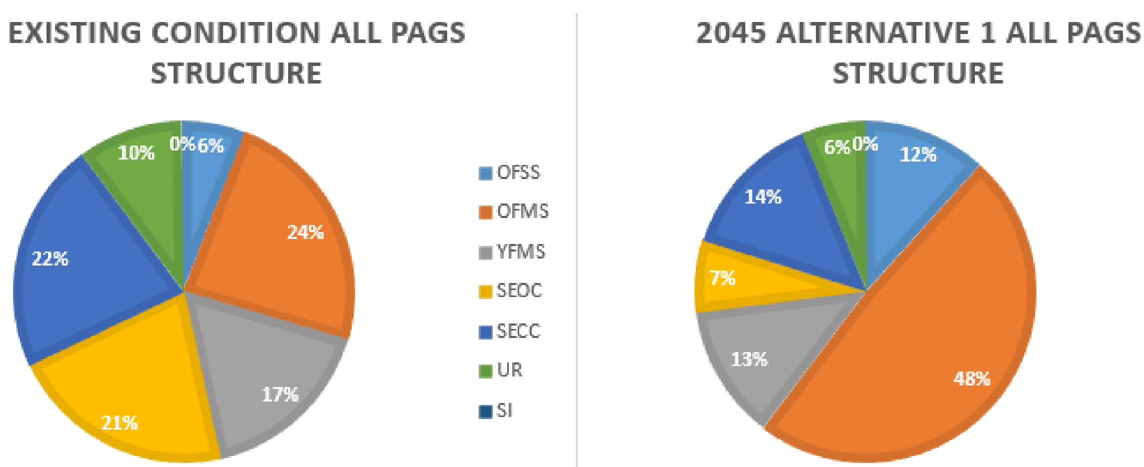

Figure 6. Forest stand structure for all plant association groups

The stand structure in the Warm Dry PAG has moved from the historical range of being well distributed throughout the different structural stages to a distribution that would be hard to naturally maintain into the future, as seen in Figure 7 below. If forested stands continue to grow as they are, modeling shows that by 2045, a majority of the Warm Dry PAG within the Camp Lick planning area would exist in the old forest multi strata stage of development, followed by stem exclusion closed canopy. OFMS would be 30 percent above the Warm Dry PAG HRV in the longer term under alternative 1.

When a majority of the stands are old forest multi strata, there is an imbalance between historical conditions and healthy stands. This imbalance can lead to a high risk from insects and disease. It is also a structure that favors late seral, and more shade-tolerant species such as grand fir. Stem exclusion closed canopy is characterized by fast-growing, vigorous trees that compete strongly for available light and moisture. The trees can grow tall, but do not put on a lot of girth. They reduce sunlight reaching the forest floor, and understory plants (including small trees) are shaded and grow more slowly. Species that need sunlight usually die; shrubs and herbs may become dormant. Establishment of new trees is precluded by a lack of sunlight or of moisture (Powell 1998). Stands that reside in the stem exclusion closed canopy stage have a high risk to stand replacing wildfire.

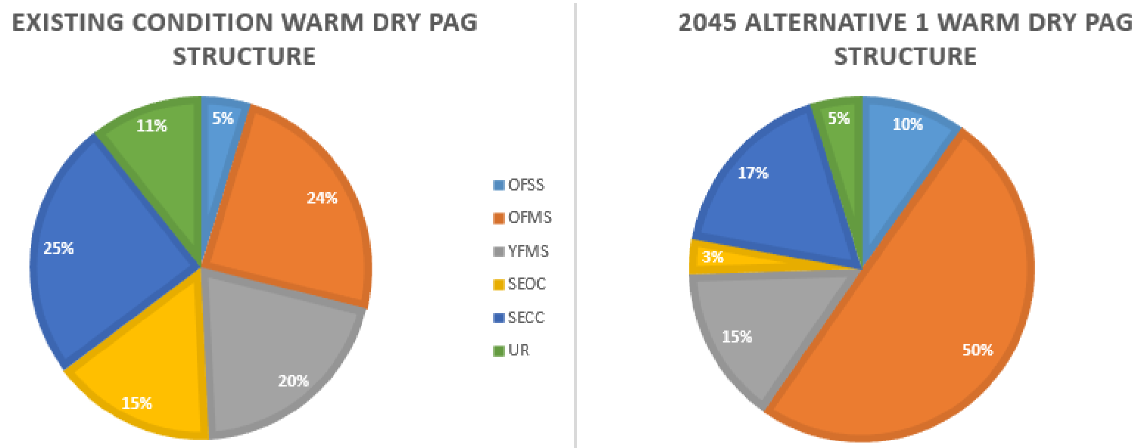

Figure 7. Forest stand structure in the Warm Dry plant association group

Cool Moist stands typically occupy mid-elevations and cooler, wetter, northerly aspects as well as draw bottoms. This leads to them having a higher percentage of multi-story stand structures as opposed to Warm Dry stands which historically had more single-story stand structures. The existing condition of the OFMS stands within the Cool Moist PAG shows the acres to be just above the HRV. A long-term analysis estimates the acres of OFMS increases by 61 percent (from 2,064 acres to 3,361 acres). This increase in acres would result in 52 percent of the Cool Moist stands residing in the OFMS stage. With over half of the Cool Moist area representing OFMS, those stands are at risk of stand replacing disturbances such as disease like Indian paint fungus, or wildfire. Powell (1998) shows that historically 10 to 30 percent of the Cool Moist PAG was represented by old forest multi strata within a 15,000 to 35,000 acre analysis area, therefore OFMS stands would be more than 20 percent above the Cool Moist PAG HRV in the long term under alternative 1.

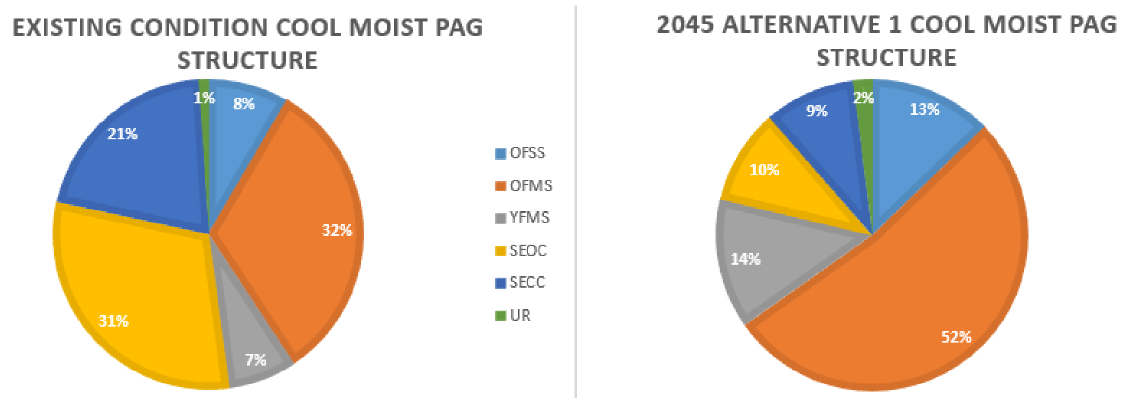

Figure 8. Forest stand structure in the Cool Moist plant association group

Cold Dry stands comprise approximately 8 percent of the planning area (3,100 acres) and are found primarily at the southern end of the planning area, typically at high elevations, northerly aspects, and colder, relatively dry areas such as frost pockets. Frost pockets are typical growing sites for lodgepole pine stands. Powell (1998) shows theses stands to have been mostly comprised of the OFMS and YFMS structural stages. With no action, the OFMS structural stage would increase over a 30 year period, but the YFMS stage would decrease. Currently less than 1 percent of the Cold Dry acres are represented by the stand initiation stage and without action there would be no increases to stand initiation. The historical range of variability, in the Cold Dry PAG, for stand initiation is 1 to 20 percent (defined by Powell 1998).

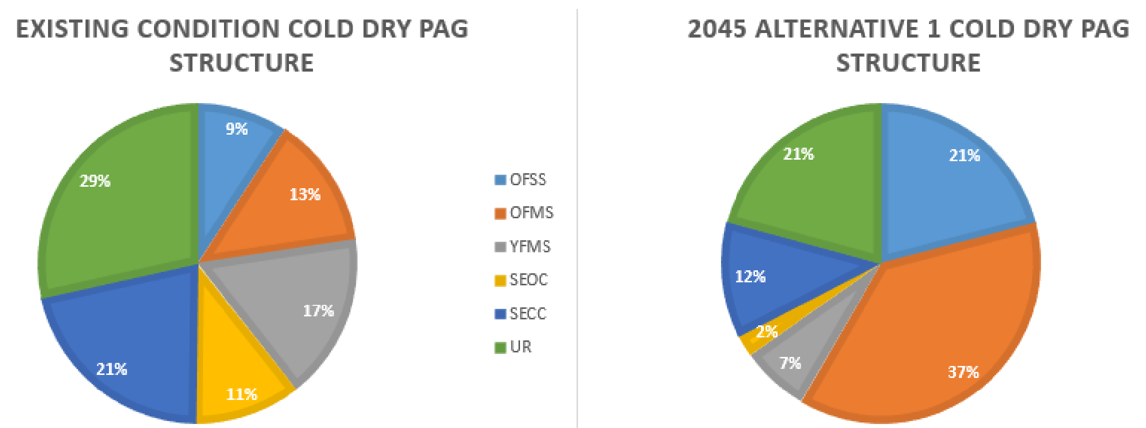

Figure 9. Forest stand structure in the Cold Dry plant association group

Stand structure would not have a visible change over the short-term within aspen stands under Alternative 1. Aspen stands would likely continue on their current trajectory over the long-term, which would mean little regeneration of aspen due to the low amount of suckers currently present and continued declining mid and overstory aspen due to conifer encroachment and lack of resources. In the event of a wildfire overlapping with an aspen stand, there could be a large change in the stand structure, dependent on the size and intensity of the wildfire. Aspen respond well to disturbances, such as fire, and sucker growth can be stimulated, as well as conifer competition reduced. “Aspen is well known as a postfire seral species. After stand-replacing fires, it regenerates abundantly by suckering and grows rapidly. Fire stimulates suckering by removal of the aspen overstory (which alters the hormone balance) and by postfire warming of the soil associated with reduced crown shading” (Swanson et al. 2010).

Cumulative Effects

By CEQ definition, there can be no cumulative effects from no action because there are no direct or indirect effects.

The Aquatic Restoration Decision, County Road 18 Healthy Forest Restoration Act Project, and Plantation Maintenance all authorize projects which decrease stand density. Some stands may transition from a stem exclusion structural stage to a young forest multi strata structural stage, but most of the activities authorized in the decisions listed above involve small diameter (less than 12 inches DBH) thinning. The County Road 18 HFRA Project authorizes approximately 1,200 acres of commercial thinning of trees less than 21 inches DBH. These projects are isolated from one another on the landscape and aim to improve stand conditions or localized issues.

Alternative 2 – Proposed Action

Direct and Indirect Effects

Stand structure changes would be measureable immediately after proposed treatments are implemented and modeling shows those structural changes would last 30 years into the future. Short-term effects of the proposed vegetation management actions in alternative 2 can be looked at for the entire Camp Lick planning area, but are more applicable when broken out by individual PAG.

Figure 10 displays the structural changes from the proposed actions over a short and long time period across all forested acres within the planning area. After implementation of alternative 2, there would be an immediate increase in OFSS acres and a reduction in OFMS acres. Added together, the total of old forest acres would be increased by 729 acres. Seven-hundred twenty-nine (729) acres out of the 40,000-acre Camp Lick planning area is not a large change in total acres of old forest, but old forest takes longer than 2 years to develop. The measureable change in old forest structure over the short-term, is apparent when OFSS is compared between alternatives 1 and 2. Two years after the proposed vegetation management actions were modeled, alternative 2 shows an increase to OFSS of 3,764 acres, compared to OFSS 2 years following no action. A majority of these acres (65 percent) are within the Warm Dry PAG, which historically was the PAG with the second highest amount of OFSS, after the Hot Dry PAG. The Hot Dry PAG comprises approximately 3.5 percent of the planning area, compared with the Warm Dry PAG which comprises approximately 55 percent. The 30 years model of alternative 2 shows that the OFSS stage contains 4,728 more acres than under alternative 1, and shows that for the OFMS stage, alternative 2 hass 7,070 fewer acres than alternative 1 over the same time period (although both alternatives result in an increase in both OFMS and OFSS over the 30 year period). In 2045, the total number of old forest acres (OFSS and OFMS added together) are 2,342 acres less under alternative 2 than under alternative 1, but more in line with the HRV within the largest PAG (Warm Dry).

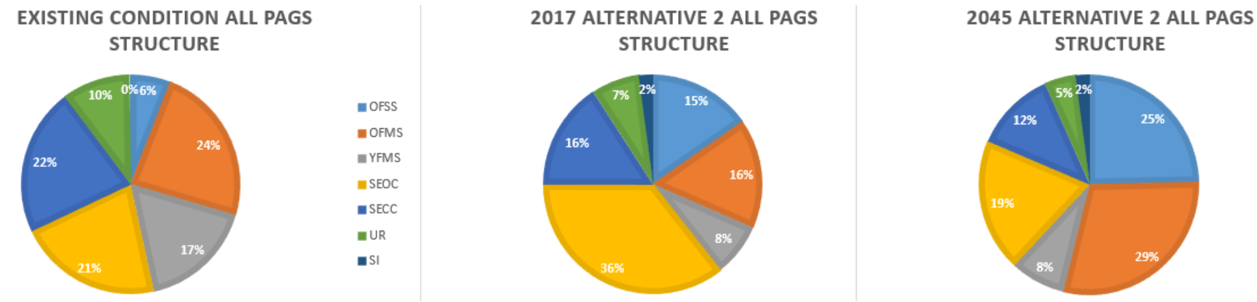

Figure 10. Forest stand structure in all plant association groups

Powell (1998) displays the Warm Dry PAG as having the second highest percentage of the OFSS structural stage after the Hot Dry PAG. Powell (1998) shows the historical range of variability to be 15 to 55 percent OFSS within Warm Dry PAG when analyzing a mid-scale analysis area with a minimum size of 15,000 to 35,000 acres. Currently, 5 percent of the Warm Dry PAG is within the OFSS stage. Old forest single stratum is characterized by many age classes and vegetation layers and usually contains large, old trees. This structural stage is one that evolved with a high frequency, low-intensity fire regime (Powell 1998). Fire suppression has changed the frequency and intensity of wildfires within the Camp Lick planning area, which in turn has changed the amount of OFSS present within the Warm Dry PAG. Alternative 2 would restore many acres of OFSS and foster growing conditions suitable to maintaining and enhancing the amount of OFSS over time. Modeling alternative 2 treatments estimates 25 percent of the Warm Dry PAG to be OFSS in 2045 (within HRV), compared to 10 percent without action (below HRV).

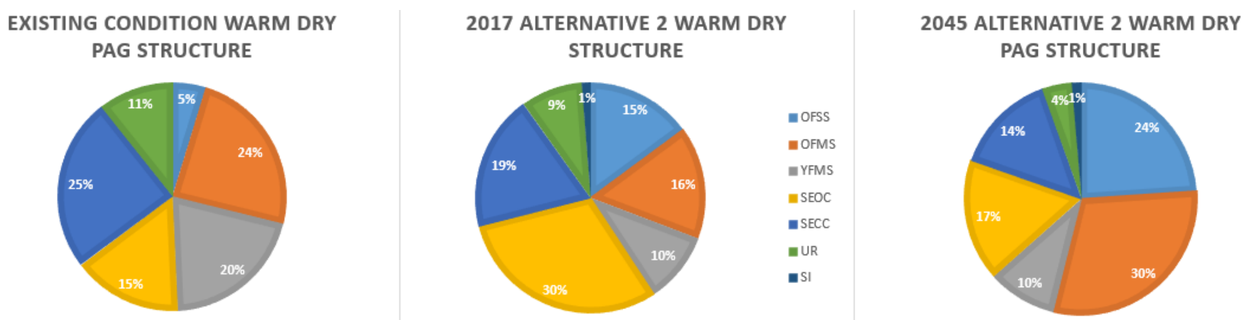

Figure 11. Forest stand structure in the Warm Dry plant association group

Alternative 2 would increase old forest within the Cool Moist PAG after implementation. Looking 30 years out, after proposed actions were implemented, the structural stages would be more evenly distributed than they are currently. Stem exclusion structural stages would be reduced over the long-term, which would mean less inter-tree competition and more room for trees to grow large and stay healthy.

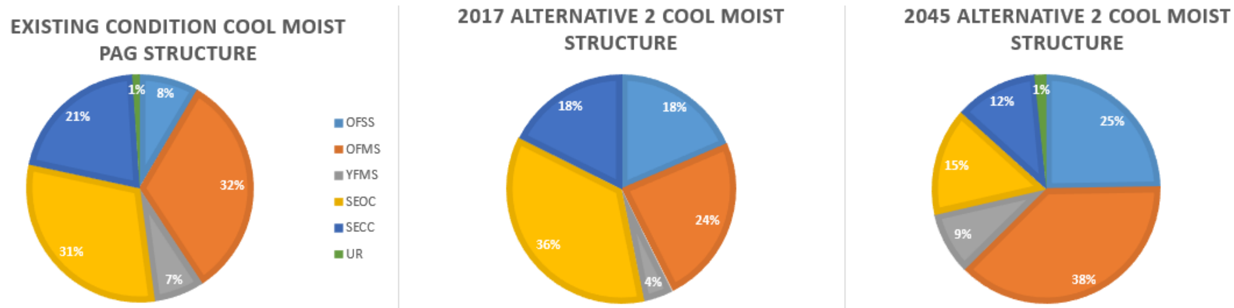

Figure 12. Forest stand structure in the Cool Moist plant association group

Overstocked Cold Dry stands identified for treatment would experience structural changes over the short- and long-term. In the short-term, old forest would increase 2 percent and over the long-term old forest would increase 18 percent above existing conditions. This is worth noting because old growth lodgepole pine stands are important for woodpeckers, and Malheur Forest Plan Forest-wide standard #59 states, "Identify potential or existing old growth lodgepole pine habitat for the three-toed woodpeckers as required by management requirements in 75-acre units at the proper spacing for species viability." Overstocked lodgepole pine stands are an easy target for the mountain pine beetle, so reducing density in these stands is a priority, while still maintaining old forest structural status. This should improve resilience to disturbance and enhance old growth lodgepole pine habitat.

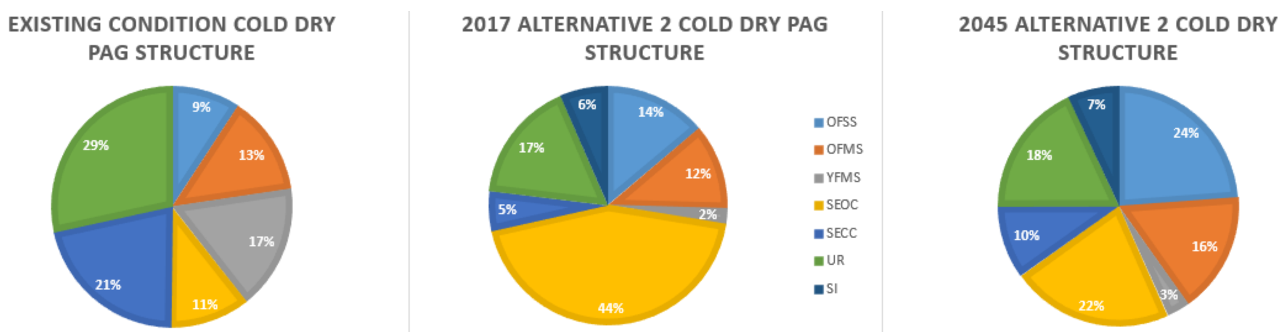

Figure 13. Forest stand structure in the Cold Dry plant association group

Aspen stands would immediately experience a change in stand structure after the removal of conifers less than 21 inches DBH and prescribed burning. Opening up stands by the removal of conifers would allow for more sunlight and water to be distributed to the aspen and the soil. "Suckers thrive in the abundance of light and generally outgrow other tree species that regenerate by seed" (Swanson et al. 2010).

Cumulative Effects

The effects from past practices (which include timber harvesting, fire suppression, and grazing) have created predominantly young, overstocked stands that currently persist across the planning area. Many of these stands fall within one of the stem exclusion structural stages, which together make up 43 percent of the total forested acres of the planning area. Implementing the mechanical methods and prescribed burning of the proposed action would increase old forest single stratum structure (primarily within the Warm Dry PAG), reduce the amount of stem exclusion over the long-term within the planning area, and set stands up to be resilient to wildfire, drought, insects, and disease.

Out of the projects listed in the Camp Lick FEA Appendix E – Past, Ongoing, and Reasonably Foreseeable Actions, the Aquatic Restoration Decision, County Road 18 Healthy Forest Restoration Act Project, and Plantation Maintenance all authorize projects which decrease stand density and may change some stand structure within the Camp Lick planning area. Some stands may transition from a stem exclusion structural stage to a young forest multi strata structural stage, but most of the activities authorized in the decisions listed above involve small diameter (less than 12 inches DBH) thinning. These types of small diameter thinning treatments generally do not change much stand structure, but do reduce stand densities, helping stand growth, tree vigor, and resilience to disturbances such as insects, disease, and fire. The County Road 18 HFRA Project authorizes approximately 1,200 acres of commercial thinning of trees less than 21 inches DBH, which would have a more substantial impact on stand structure than the thinning limited to less than 12 inches DBH, although it would effect a relatively small portion of the Camp Lick planning area (3 percent).

Compliance with Forest Plan and Other Relevant Laws, Regulations, and Policies

Late and old forest (LOS) stand structure would increase under alternative 1, but the Warm Dry PAG would not be within the historical range of variability as described by Powell (1998). This scenario is not in alignment with Regional Forester's Plan Amendment #2 which references identifying structural conditions and biophysical environment combinations that are outside the HRV conditions to determine potential treatment areas. The Warm Dry PAG currently falls under 6(d) Scenario A, where one of the LOS stages exists below the HRV in a particular biophysical environment within a watershed. Late and old forest stands are comprised of two different structural stages, single story (OFSS) and multistory (OFMS). Currently, the Warm Dry PAG within the Camp Lick planning area is above the HRV for OFMS and below the HRV for OFSS. Alternative 1 shows increases to both OFMS and OFSS over time, but leaves OFSS below the HRV and OFMS further above the HRV.

Old forest (late and old structure) would not be decreased under alternative 2, but shifted to better align with the HRV. Old forest multistory stands would be thinned, which would in turn move some of them into old forest single stratum stands. Modeling of alternative 2 actions shows both OFSS and OFMS within the HRV following implementation. Looking out 30 years after alternative 2 actions were modeled, OFSS would still be within the HRV and OFMS would be above the HRV.

Removal of Trees Greater Than 21 Inches Diameter at Breast Height in Late and Old Structure Stands

Alternative 2 (proposed action) would require a forest plan amendment to Regional Forester's Eastside Forest Plan Amendment 2, Eastside Screens, to allow removal of grand fir and Douglas-fir trees greater than or equal to 21 inches DBH that currently exist within late and old structure stands (LOS) under Scenario A, where OFSS is below the HRV within the Warm Dry PAG. Removal of grand fir and Douglas-fir trees greater than or equal to 21 inches DBH would be limited to areas where removal of grand fir and Douglas-fir would restore or enhance ecologically sustainable stand structures. The goal is to restore OFSS to within the HRV and improve growing conditions for ponderosa pine and western larch, so they are enhanced on the landscape. Removal of some of these trees would decrease the number of large (greater than or equal to 21 inches DBH) trees in some treatment units, but there would be no loss of late and old structure by maintaining a minimum of 10 trees per acre greater than or equal to 21 inches DBH. Another goal for the trees greater than or equal to 21 inches DBH is to promote the longevity of more fire-tolerant and disease-resistant ponderosa pine and western larch.

Scenario B allows timber harvest in LOS if OFMS and OFSS are within or above HRV. Cool Moist and Cold Dry PAGs meet Scenario B as they are both above the HRV in OFSS and within the HRV in OFMS.

Eastside Screens describes LOS as where “large trees are common.” The Malheur National Forest has consistently defined LOS as stand conditions having 10 trees per acre greater than or equal to 21 inches DBH. Removal of some grand fir and Douglas-fir greater than or equal to 21 inches DBH and less than 150 years old for the purposes of improving and maintaining the ponderosa pine and western larch component may occur. However, LOS stands would not be reduced to less than 10 trees per acre of trees greater than or equal to 21 inches DBH.

Forest Composition

Affected Environment

Existing Condition

Past management activities including timber harvest and fire suppression have changed the species composition under most forest types. Ponderosa pine and dry-mixed conifer (Hot Dry and much of the Warm Dry PAGs) were largely open forest types maintained by fire in a species mix dominated by early seral species.

Hot Dry forests occupy approximately 4 percent of the planning area occurring in the lower elevations and south facing slopes. Warm Dry forests occupy approximately 55 percent of the planning area, generally occurring across residual and Mollisol soils. Due to the similarity of forest structure and composition between the Warm Dry and Hot Dry forests, and the relatively small amount of acres of Hot Dry forest, these PAGs are discussed together.

Hot Dry and Warm Dry PAGs are represented by an array of plant associations (Powell et al. 2007), indicating the wide range of environments they occupy. The Hot Dry PAG includes many of the ponderosa pine plant associations. The Warm Dry PAG includes some of the ponderosa pine plant associations, some of the Douglas-fir plant associations, and a few of the drier grand fir plant associations (up to and including the grand fir/birchleaf spirea association). Ground vegetation generally consists of pine grass, elk sedge, Idaho fescue, bluebunch wheatgrass, mountain big sagebrush, mountain mahogany, common snowberry, and birchleaf spirea.

Fire is the major natural disturbance agent in dry forests. Historical fire disturbance regimes in these forest environments can be best characterized as high frequency/low intensity. Fires started by natural ignition (i.e. lightning) or American Indian people burned in the form of underburns and small areas of lethal fires on a frequency of every 10-35 years in these forest types (Agee 1993, Hall 1977). The frequency of these fires made them an agent of stability in these forest ecosystems because they kept the ground vegetation dominated by fire adapted grasses (such as pine grass and elk sedge) and shrubs (ceanothus, snowberry, Oregon grape), while promoting and maintaining mature forest vegetation dominated by early seral species, such as ponderosa pine, western larch and, to a lesser extent, Douglas-fir. Succession to shade tolerant species (as well as associated multi-strata structures) only occurred in areas that escaped several fire cycles. Western juniper is another species that has increased across the Warm Dry and Hot Dry PAGs due to the change in fire disturbance regimes.

Munger (1917) describes western yellow pine (ponderosa pine) stands as "always rather open" because of the shade intolerance of ponderosa pine. He notes about their shade intolerance, "western yellow pine is as intolerant as any of the trees with which it is associated in Oregon, and its reproduction cannot compete successfully in the virgin forest with that of Douglas-fir, white fir, or lodgepole pine on sites where the latter grow vigorously." Munger also discusses how the open pine stands are a product of surface fires. "Light, slowly spreading fires that form a blaze not more than 2 or 3 feet high and that burn chiefly the dry grass, needles, and underbrush start freely in yellow-pine forests, because for several months each summer the surface litter is dry enough to burn readily. Practically every acre of virgin yellow-pine timberland in central and eastern Oregon has been run over by fire during the lifetime of the present forest, and much of it has been repeatedly scourged" (Munger 1917). Currently, most of the ponderosa pine stands within the planning area are not "rather open" due to fire suppression and the ingrowth of shade-tolerant trees like Douglas-fir and grand fir.

In dry ponderosa pine/Douglas-fir-sites, there is evidence of current year western pine beetle (WPB, *Dendroctonus brevicomis*) and MPB attacks in ponderosa pine. Populations of both of these beetles are currently high in the Blue Mountains and the planning area. The Blue Mountains Forest Insect and Disease Service Center report states the biggest threat to ponderosa pine in dry sites is bark beetle attacks. Moisture stressed trees are particularly vulnerable to bark beetle attacks, and when tree populations are high, lethal attacks are even more likely. The recommendation is to manage stands to the lower limit of the management zone.

Areas where lodgepole pine has started regenerating under overstory ponderosa pine and western larch due to fire suppression was also noted as an area of concern by the Blue Mountains Forest Insect and Disease Service Center. The lodgepole is increasing moisture stress to the pine and larch. Ponderosa pine is highly susceptible to western pine beetle attack in these circumstances, and the larch likely will succumb to competition. The lodgepole also provides a fuel ladder into the crowns of the overstory trees that historically would have survived more frequent fires. The recommendation is to remove the lodgepole pine from the understory.

Cool Moist forests occupy approximately 16 percent of the planning area. They generally occur where ash soils exist, on north facing slopes, and in draw bottoms. The Cool Moist PAG is represented by an array of plant associations and includes many of the grand fir, lodgepole pine (grand fir), lodgepole pine (subalpine fir), and subalpine fir plant associations. Ground vegetation generally consists of big huckleberry, queencup beadlily, grouse huckleberry, twinflower, false bugbane, Pacific yew, and a wide variety of herbs and shrubs.

The historical vegetation of the Cool Moist, or moist mixed conifer (MMC), forest was controlled by frequent to moderately frequent fires (less than 20 to 50 years) that burned with mixed severity, containing both low- and high-severity patches. In most parts of the MMC forest, this fire frequency has been suspended, and disturbance regimes have been altered through a combination of historical drivers including grazing, loss of Native American fire ignitions, and active fire suppression. Consequently, the current MMC forest vegetation contains a greater component of shade-tolerant tree species (e.g., white or grand fir or understory Douglas-fir) than occurred in the historical vegetation. Under historical or more fire- and drought-resilient states, these shade-tolerant species would have been less common in the understory in many areas, and large fire-resilient ponderosa pine, Douglas-fir, and western larch would have dominated the canopy layer (Stine et al. 2014).

Species composition includes ponderosa pine, lodgepole pine, western larch, Douglas-fir, grand fir, Engelmann spruce, and western white pine. These stands are generally uneven-aged, with trees ranging from seedlings and saplings to large, old trees (300+ years). The large, old trees tend to be early seral, ponderosa pine and western larch. However, large, old grand fir and Douglas-fir also exist in moist pockets and protected areas. Younger trees are predominantly grand fir, however, due to the productivity of these sites small openings in the canopy provide the conditions for natural regeneration of early seral species also. These stands tend to be very dense, have a high degree of structural diversity, and have many large diameter trees and snags. This area of the Malheur National Forest did not have a lot of western white pine historically because of the topography and elevation of the area. However, it is found in the moister, eastern part of the planning area, near the boundary of the Ragged Ruby Project, which contains much more western white pine. The current state of the western white pine is concerning. The Blue Mountains Forest Insect and Disease Service Center report states, "many western white pine in this area had dead tops caused by white pine blister rust, and most of the abundant understory seedlings and saplings supported high levels of infection (section 29, 600 feet west of the junction of roads 3675 and 3640)." The report also notes, "Shade tolerant species are currently favored and out-compete western white pine due to shading and competition for soil moisture due to fire exclusion beginning in the early 1900s."

Currently, aspen stands within the planning area are composed of both conifer and aspen trees. Some field surveys from 2016 note "extreme conifer encroachment" and that "aspen [are] shaded out." Some of the aspen stands have fences around them to deter browsing, but those represent a minority of the stands.

Desired Condition

Malheur Forest Plan Forest-wide standard #98 states, "Maintain stand vigor through the uses of integrated pest management such as stocking level control and species composition in order to minimize losses due to insects and disease" (USDA Forest Service 1990a, page IV-37).

Early seral tree species are a keystone to the Warm Dry PAG. They consist of the relatively shade-intolerant ponderosa pine and western larch, considered the "backbone" of a stand that remains after many types of disturbances take place. The ponderosa pine bark grows thicker with age, making it increasingly fire resistant. Western larch are also very fire resilient and are well adapted to seedbeds exposed by burning (DeByle 1981). Ponderosa pine and western larch can live to be over 900 years old in properly functioning systems (Van Pelt 2008). Properly functioning Warm Dry stands have frequent fire return intervals that kill the smaller, more shade-tolerant fir. This is an important variable when trying to promote ponderosa pine and western larch. Without a natural wildfire cycle or other disturbance method of allowing more sunlight into stands, the more shade-tolerant fir will outcompete many of the early seral tree species in the Warm Dry PAG. It is desired to have an increase in the percentage of early seral tree species across the Camp Lick planning area.

In June of 2014, the Forest Health Protection Blue Mountains Forest Insect and Disease Service Center visited the Camp Lick planning area and provided a report of their findings dated June 15, 2015. They noted potential insect and disease related issues and solutions such as, "The objective of vegetation treatments in this area is to increase and create resiliency, particularly to fire, and restore meadows and riparian areas. Evidence of long-term fire suppression is widespread here in the forest stands succeeding to shade tolerant late seral species. . . . Where lodgepole pine has come in under ponderosa pine, improve resistance to mountain pine beetle, *Dendroctonus ponderosae* (MPB), by removing the lodgepole pine. . . . Manage white pine blister rust and MPB in western white pine by thinning stands to improve air circulation and tree vigor, culturing apparent blister-rust resistant individuals, and planting available resistant seedlings. Where lodgepole pine occurs mixed with western white pine, removing the lodgepole will reduce the risk of MPB infestation.” These recommendations are in line with Malheur Forest Plan Forest-wide standard #98 and the full report is available in the project record. Five needle pines like the whitebark pine and western white pine are the rarest conifers on the Malheur National Forest. There are no whitebark pine within Camp Lick, but there are areas containing western white pine and it is desired to maintain and if possible increase the population within the area.

Fairly intensive timber cruise surveys were completed on the current Malheur National Forest and documented by Matz in the years 1927 and 1928. These cruises were almost entirely within the ponderosa pine or “yellow pine” type as it was called at that time. There were other species besides ponderosa pine present in this type and rather large, pure pine stands were noted as well, one over 5,000 acres. He wrote about the yellow pine, “Throughout all of the mature age class of this type, there is a fair sprinkling of trees of all age classes which is highly desirable for cutting under the selection system. There is usually a mixture of inferior species of varying density along with the pine in this type. There are, however, a number of areas where there is a pure stand of pine, the largest of which contains about 5,100 acres and is situated in the northwest portion of T. 18S., R. 35 E. and in the township immediately adjacent to the west. Another pure stand of about 2,500 acres occurs in the northeast portion of T. 17 S., R. 33 ½ E. and in the township joining on the east. Smaller areas of pure pine stands, one section and less in size, occur in other parts of the project, but throughout most of the area typed as pine there is a representation of Douglas-fir, white fir, larch and lodgepole pine” (Matz 1928). While pure pine stands did exist on the Malheur National Forest, Matz notes that most areas of pine contained Douglas-fir, white fir (grand fir), larch, and lodgepole pine.

In 1912, T.T. Munger wrote a report detailing a silvicultural study made by Forest Service field parties in 1910 and 1911 of western yellow pine (ponderosa pine) in Oregon. He notes “the present forest is mixed to a variable degree with several other species.” The desired conditions after proposed treatments in pine type stands would retain other species, as were noted as being present historically by Matz and Munger.

The desired species composition within aspen stands would have minimal conifers. Conifers greater than or equal to 21 inches DBH are desired to stay standing or to be felled or tipped for stream restoration, particularly within aspen stands that are part of the riparian habitat conservation area. Conifers greater than 150 years old are desired to remain and provide habitat diversity within aspen stands. "Managers in our area agree that all conifers should be removed in treated aspen stands, except for those that must be retained to meet other management objectives (e.g., large-tree conservation or stream shading)" (Swanson et al. 2010).

Environmental Consequences

Alternative 1 – No Action

Direct and Indirect Effects

Without action, species composition within the planning area would see increases in more shade-tolerant, late seral tree species such as grand fir and Douglas-fir. This would occur in upland stands, riparian stands, meadows, and aspen stands. The more shade-intolerant, early seral ponderosa pine and western larch, as well as aspen, would decrease over time. Older ponderosa pine and western larch are thicker-barked trees which can be very fire resistant, so overall fire resistance would continue to decline across the landscape given no action. Figures 14 and 15 depict the change in species composition modeled over a 30 year period within the entire Camp

Lick planning area and within only the stands proposed for silviculture treatment and riparian treatments such as aspen restoration, meadow restoration, and ecological riparian thinning. The percentage values are based on wood volume per species.

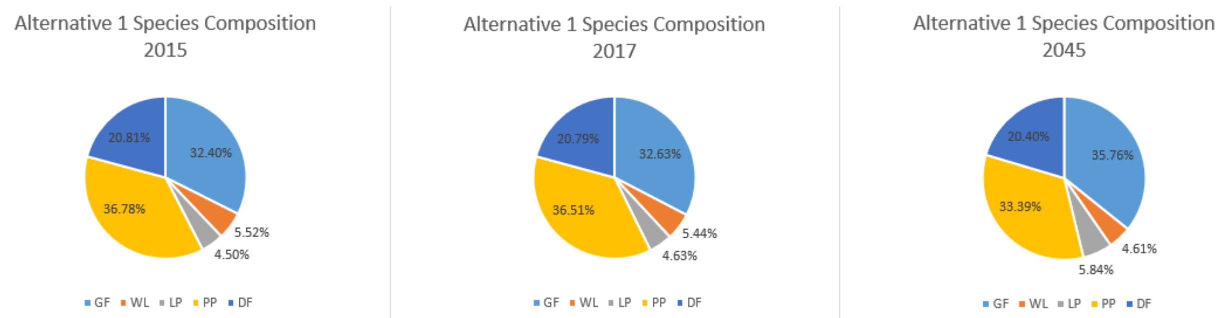

Figure 14. Alternative 1 species composition within Camp Lick planning area

Figure 15. Alternative 1 species composition within proposed treatment stands

Cumulative Effects

By CEQ definition, there can be no cumulative effects from no action because there are no direct or indirect effects, therefor no cumulative effects would occur.

Previously discussed past, ongoing, and reasonably foreseeable future actions such as the 2002 Plantation Maintenance Project and the 2010 County Road 18 HFRA Project would affect species composition within site specific units, but would fail to shift species composition across the landscape.

Alternative 2 – Proposed Action

Direct and Indirect Effects

When analyzing the proposed treatment stands within the Camp Lick planning area, shade intolerant early seral trees such as the ponderosa pine and western larch would comprise 5 percent more of the total wood by volume under alternative 2,compared to alternative 1, immediately following modeled treatments. The more shade tolerant, late seral Douglas-fir and grand fir would comprise 4 percent less of the total wood by volume under the same modeling. Thirty years modeled into the future, the percent of the total wood volume of ponderosa pine and western larch trees would be 7 percent greater under alternative 2 and the Douglas-fir and grand fir would be 6 percent lower than under alternative 1.

Across all the forested stands within the planning area, alternative 2 would increase the percentage of ponderosa pine and western larch in the short-term by 1.3 and 0.3 percent, respectively. Grand fir and lodgepole pine would see reductions in their percentages by 0.95 and 0.19 percent, respectively. Looking out 30 years, the percentage of ponderosa pine and western larch would increase by 2.01 and 0.51 percent respectively. Grand fir and lodgepole pine would decrease by 1.93 and 0.37 percent, respectively, compared to alternative 1. Douglas-fir would remain relatively constant at 20 percent over the short- and long-term analysis timeframe.

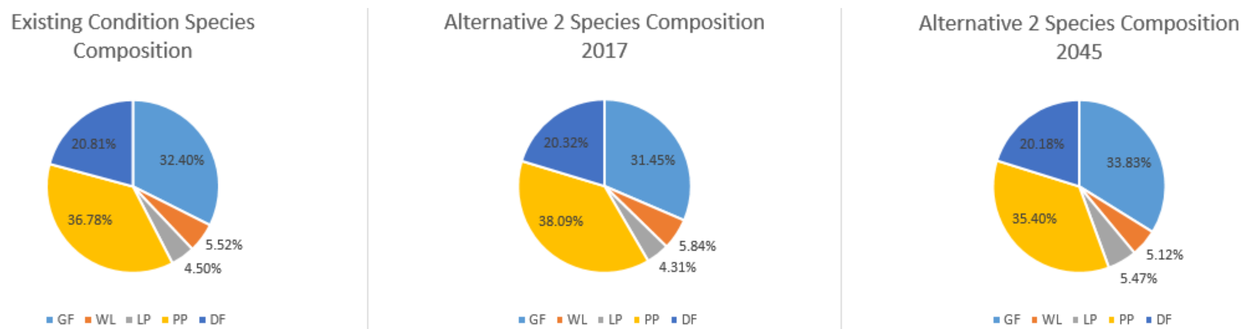

Figure 16. Alternative 2 species composition within Camp Lick planning area

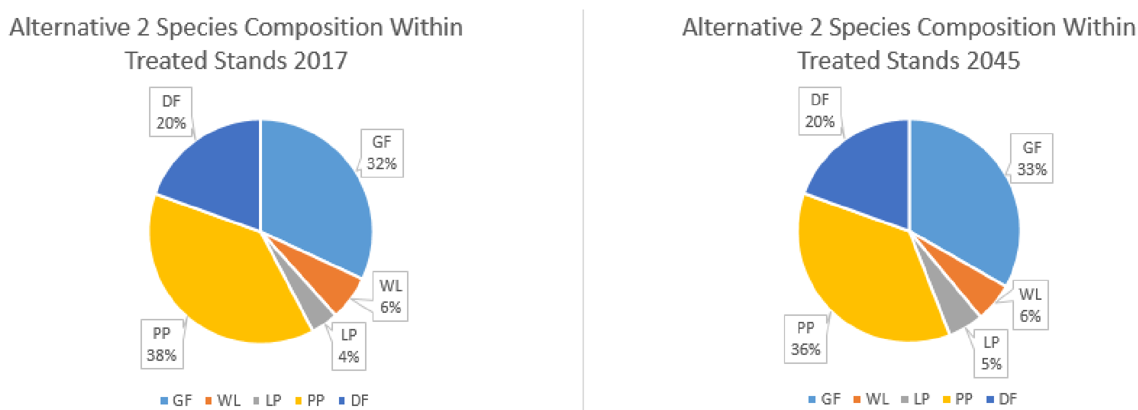

Figure 17. Alternative 2 species composition within proposed treatment stands

Under alternative 2, aspen stands would have all the conifer less than 150 years old and less than 21 inches DBH felled, with the exception of most western larch and ponderosa pine with high ground-to-crown height, and possibly removed, piled and burned, or used for buck and pole fencing around the aspen stands to deter browsing and allow aspen suckers and saplings a better chance of survival. Direct effects of removing conifers would be increased sunlight and water availability to aspen. This would allow for increased aspen vigor and longevity. “Suckers thrive in the abundance of light and generally outgrow other tree species that regenerate by seed” (Swanson et al. 2010).

Cumulative Effects

The effects from past practices (which include timber harvesting, fire suppression, and grazing), and wildfire have created predominantly young, overstocked stands of late seral species that currently persist across the planning area. Implementing the mechanical methods and prescribed burning of the proposed action would reduce stand density and shift species composition of the treated stands in predominantly the mid and old forest stands, primarily in the Warm Dry PAG.

Stands that are not treated would continue on the current trajectory as defined in the no action alternative.

The 2002 Plantation Maintenance Project is an ongoing project that utilizes precommercial (less than 12 inches DBH) thinning over approximately 3,640 acres within the Camp Lick planning area. The 2010 County Road 18 HFRA Project is an ongoing project in which all of the commercial and precommercial thinning has been completed and the burning operations are ongoing. Cumulatively, the thinning identified in these projects, along with the stands identified under alternative 2, would enhance the shift in species composition to promoting early seral ponderosa pine and western larch trees across the planning area and connect resiliency between stands across the landscape in terms of susceptibility to insects and disease.

Compliance with Forest Plan and Other Relevant Laws, Regulations, and Policies

Alternative 1 would maintain all forested stands in the current condition over the short-term (2 years) and continue them along their current trajectory over the long-term (30 years). That equates to leaving late seral, shade-tolerant trees in overstocked stands across the planning area, where they would continue to grow, reproduce, and outcompete early seral, shade-intolerant ponderosa pine and western larch.

Alternative 2 would thin overstocked stands and target shade tolerant grand fir and Douglas-fir for removal over ponderosa pine and western larch. Individual tree health would also be taken into consideration and there may be instances where healthy, thriving grand fir or Douglas-fir may be left and unhealthy ponderosa pine or western larch may be removed. This would be determined on site, during implementation, with guidance from the silvicutural prescriptions and marking guides.

The aspen stands within the planning area would not be maintained or enhanced under alternative 1; aspen would not be stimulated by disturbance or protected from ungulates. Alternative 2 would cut conifers out of aspen stands and around aspen stands, allowing for expansion, and allow fencing for ungulate protection. The proposed actions would introduce soil disturbance, which stimulates aspen shoots. “Periodic disturbance is necessary to maintain clone vigor” (Swanson et al. 2010). Alternative 2 would also allow for burning in aspen stands within the proposed burn blocks. These actions are in alignment with Malheur Forest Plan Forest-wide standard #57, “ Maintain or enhance quaking aspen stands using clearcutting and prescribed fire as the principal means of regeneration where appropriate. Protect root sprouts where needed and practical” (USDA Forest Service 1990a, page IV-31).

Removal of Trees Greater Than 21 Inches Diameter at Breast Height

Alternative 2 would require a Forest Plan amendment to Regional Forester’s Eastside Forest Plan Amendment 2, Standard #6(d)(2)(a): “Maintain all remnant late and old seral and/or structural live trees greater than 21 inches DBH that currently exist within stands proposed for harvest activities.” Alternative 2 would retain trees 150 years or greater in age versus all trees greater than 21 inches DBH. This amendment is proposed to allow removal of young (less than 150 years old), relatively large (greater than or equal to 21 inches DBH) grand fir and Douglas-fir trees that are competing with older ponderosa pine or western larch, within the Warm Dry PAG, causing competition stress and increasing the risk that the older trees may die as a result of insects, drought, or wildfire. By reducing tree densities, the older trees would have greater access to water, nutrients, and sunlight resulting in not only their continued existence, but increased growth, health, and vigor (McDowell et al. 2003). Trees greater than 150 years old would be determined by the application of the guidelines “Identifying Old Trees and Forest” (Van Pelt 2008).

Other Relevant Mandatory Disclosures

There are no anticipated long-term significance factors from the proposed action since forest vegetation is renewable as long as the soil productivity is maintained. There may be short-term loss of growth related to soil compaction from new landings, temp roads, and skid trails. In compliance with Malheur Forest Plan standards, the area of detrimental soil impacts within each unit would not exceed 17 percent (20 percent minus 3 percent for roads). Detrimental soil conditions would be near the practical minimum.

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